

REMARKS

Pursuant to the filing of the accompanying Request for Continued Examination and responsive to the Advisory Office Action of May 13, 2002, Applicants kindly request entry of the above amendments and reconsideration of the objections and rejections contained in the previous final Office Action as well as the Advisory Office Action.

STATUS OF THE PRESENT APPLICATION

In this application, a final Office Action had issued on December 21, 2001. Subsequently, on April 17, 2002, Applicants conducted an interview, and agreement appeared to be reached on a number of issues in the application. Accordingly, Applicants submitted a subsequent response setting forth their position as explained in the interview.

However, in the Advisory Action that the Examiner issued on May 13, 2002, the Examiner indicated that, upon review of the specification, the Examiner did not consider there to be support in the specification of the language of claims 73 and 80, or the language of claims 12, 38, 45, 49, 68, 70 and 71.

It is believed and maintained that the limitations of the claims are clear and fully supported by the specification. This will be explained below. It is further believed and submitted that upon such clarification and discussion as set forth below, it will become clear that Hoshizaki does not properly anticipate or render obvious the claims.

Claims 73 and 80 have been amended above to try to address the concerns that have been raised by the Examiner. However, it must be noted that such amendments are not made because they are deemed to be necessary, as it is believed that the language as previously set forth was clearly supported by the specification and drawings, and clearly distinguish over the Hoshizaki reference.

CLAIMS 73 AND 80 HAVE CLEAR SUPPORT IN THE SPECIFICATION

The Examiner's attention is respectfully directed to Figs. 6 and 7. Fig. 6 is a cross-sectional view showing details of a top ring and a presser ring of a polishing apparatus according

to the patent. Turning to the description of these figures beginning at about line 41 of column 8, it is described that a top ring 1 for holding a workpiece, has a plurality of chambers C1-C3. Chamber C₁ is at a central position. An annular second chamber C₂ is radially outside of the first chamber C1, and a third chamber C₃, which is also annular, is disposed radially outside of the first chamber C1.

It can be readily seen from Fig. 6 that the radial width (i.e. the width taken in a radial direction) of, for example, chamber C₃ is narrower than the radial width of chamber C₁. This can also be readily appreciated from Fig. 7, which shows a top view of the chamber arrangement. Thus, as noted beginning at lines 66 of column 8, three concentric annular areas A1, A2 and A3 are defined in the holding surface of the top ring 1 by allowing the openings in the respective areas to be communicated with the respective chambers. Thus it is respectfully submitted to be clear that the drawings of the present application clearly disclose what is claimed. In other words, the drawings provide clear support for the claim limitations. Looking at the drawings, it can be readily seen that the chamber C₃ has a significantly smaller radial width than chamber C₁. As such, the disclosure is inherent, and the claim limitations are inherently supported by the drawings.

To make the distinction even clearly, Applicants have amended claims 73 and 80 above. However, the basic point here is the same as with the previous claim language. Thus, the radial width along the radius of the top ring of the outer one of the plurality of chambers is narrower than a radius of central one of the plurality of chambers. In the context of claim 80, the area where the polishing pressure is applied is divided into at least a central area and an outer circumferential area of the workpiece, with a radial width along the radius of the top ring of the outer circumferential area being narrower than a radius of the central area. It is respectfully submitted that this limitation is quite clear. It is the radial extent, i.e. the width or extent along the radius of the top ring, of the outer chamber that is smaller than that of the central chamber. It is submitted that such is quite clear, obviously supported by the drawings, and serves to clearly distinguish over Hoshizaki.

CLAIMS 12, 38, 45, 49, 68, 70 AND 71 HAVE CLEAR SUPPORT IN THE SPECIFICATION

In the Advisory Action, the Examiner also questioned the support in the specification for the language of claims 12, 38, 45, 49, 68, 70 and 71. It is noted that in general the language of these claims is similar, though there are slight variations in the expression in the various claims. The Examiner specifically noted that in "column 5, lines 35-43, 'variable independently' language was found to describe the relationship between F1 (pressing force on wafer) and F2 (pressing force on presser ring 3). These are not pressing forces on concentric areas A1-3 on the wafer. Therefore, it is unclear what is meant by 'independently adjustable pressure.'" However, other portions of the specification clearly support the language of these claims.

It is first worth noting the relevant language of the claims. Independent claim 12 recites a method of a polishing surface of a workpiece in which the workpiece is pressed against a polishing surface of a turntable "to polish a surface of the workpiece by applying independently adjustable pressures to substantially concentric circular areas of the workpiece, respectively." Claim 38, which was added by amendment, discusses the application of first and second polishing pressures to different portions of a workpiece wherein the first polishing pressure is different than the second polishing pressure, and "the first and second polishing pressures are independently adjustable."

Claim 45 is slightly different in requiring the provision of "a plurality of independently adjustable polishing pressures for application to the workpiece." In claim 49, the language is slightly different in that the "the first polishing pressure and the second polishing pressure are controllable independently of each other." Similar language is used in independent claims 68, 70 and 71.

Thus it may be seen that the limitations in the various independent claims recite that there are different polishing pressures that are either independently adjustable or independently controlled. Support for this language in the specification will be clarified below.

The Examiner's attention is directed to the embodiment beginning with the description of Fig. 5. In particular, the Examiner's attention is directed to the description beginning at line 42 of column 8 through line 10 of column 9.

As has been previously discussed, a top ring 1 includes first chamber C1, annular second chamber C2 radially outside of the first chamber C1, and annular third chamber C3 at a radially outer side of the second chamber C2. "The first chamber C1 is connected to a compressed air source 24 as a pressurized fluid source through a valve V1 and a regulator R1, the second chamber C2 is connected to the compressed air source 24 through a valve V2 and a regulator R2, and the third chamber C3 is connected to the compressed air source 24 through a valve V3 and a regulator R3." Column 8, lines 48-58.

Accordingly, it can be readily seen from this description and from the drawing figures that each of the respective chambers are connected to separate valves and pressure regulators. The pressure regulators are connected to a compressed air source. This alone makes it clear to one of ordinary skill in the art that the invention is capable of independently regulating the air pressure in each of the respective chambers. In other words, three concentric annular areas A1, A2 and A3, as illustrated in Fig. 7, are defined in a holding surface of the top ring 1 by allowing the openings 1₀ and 2₀ to communicate with the first, second and third chambers C1, C2 and C3. Compressed air at different pressures can be supplied to the respective annular areas A1, A2 and A3. Note the discussion spanning columns 8 and 9.

As indicated in the specification beginning at line 3 of column 9, "the compressed air having different pressure from one another can be supplied to respective annular areas A1, A2 and A3. Pressure gauges or pressure sensors G1, G2 and G3 are provided in the respective pressurized fluid supply lines, and the pressure in the respective chambers C1, C2 and C3 can be independently controlled on the basis of the pressures detected by the pressure gauges G1, G2 and G3."

The discussion at the top of column 9 provides clear and unambiguous support for the language of each of the independent claims. The language of independently controlling the pressure on the respective chambers is clearly provided in the specification. Furthermore, such is clearly capable with the structure discussed in the specification and illustrated in the drawings.

The word "adjustable" is not be used in the above-referenced discussion. However, it is respectfully submitted to be clear to one of ordinary skill in the art that the specification supports

independently adjustable pressures from the above description and illustrated features. In particular, the presence of regulators for regulating the pressure means that the pressure is capable of being adjusted.

To emphasize this point, the Examiner's attention is directed to the specification beginning at line 49 of column 10. "The pressures of compressed air supplied to the first chamber C1, the second chamber C2 and the third chamber C3 are changed respectively, that is, compressed air having a pressure of p_1 gf/cm² is supplied to the first chamber C1, compressed air having a pressure P_2 gf/cm² is supplied to the second chamber C2, and compressed air having a pressure of p_3 gf/cm² is supplied."

The Examiner's attention is further directed to column 5, lines 13-31. "The pressures of pressurized fluid supply to the first chamber C1, the second chamber C2 and the third chamber C3 are changed, respectively. That is, pressurized fluid having a pressure of p_1 gf/cm² is supplied to the first chamber C1, pressurized fluid having a pressure of P_2 gf/cm² is supplied to the second chamber C2, and pressurized fluid having pressure of p_3 gf/cm² is supplied to the third chamber C3, respectively. In this manner, the pressures of pressurized fluid ejected from the respective annular areas of the holding surface of the top ring 1 are varied."

Thus, from the above it is seen to be clear that the pressures of the air supplied to the chambers C1, C2 and C3 are regulated by the regulators R1, R2 and R3, respectively. The chambers C1, C2 and C3 positionally correspond to the annular areas A1, A2 and A3, respectively. The pressure in the respective chambers is independently controllable on the basis of the pressures detected by the pressure gauges G1, G2 and G3. Accordingly, the limitation of independently adjustable or controllable pressures as set forth in each of claims 12, 38, 45, 49, 68, 70 and 71 is clearly and unambiguously supported by the specification.

CONCLUSION

In view of the above, it is respectfully submitted that all of the concerns raised by the Examiner in the Advisory Office Action have been addressed. Further, from the interview and the previous response it is respectfully submitted to be clear that the present invention as set forth in

all of the independent claims pending in the application clearly patentably distinguish over Hoshizaki. Indication of such is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "Version with Markings to Show Changes Made".

Respectfully submitted,

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73. (Amended) A polishing apparatus for polishing a surface of a workpiece, comprising:

a top ring for holding a workpiece; and

a plurality of chambers formed in said top ring, fluid pressures being supplied in said respective chambers to provide polishing pressure to a central area and an outer circumferential area [of the workpiece], wherein a radial width along a radius of said top ring of an outer one of said plurality of chambers is narrower than a radius of a central one of said plurality of chambers [of said outer circumferential area is narrower than that of said central area].

80. (Amended) A method for polishing a workpiece, comprising:

holding a workpiece on a surface of a top ring; and

applying a polishing pressure on a surface of the workpiece, wherein an area where said polishing pressure is applied is divided into at least [to] a central area and an outer circumferential area of the workpiece, and [the] a radial width [of said outer circumferential area is narrower than that of said central area] along a radius of said top ring of the outer circumferential area is narrower than a radius of the central area.